EXHIBIT NO. 32

Open Channel Symbols, Equations, and Geometric Formulas

SYMBOLS

Symbol	Units	Description
A	sq. ft.	Area of cross section of flow
b	ft.	Bottom width of trapezoidal channel
c		Side slope of channel, c:1
d_c	ft.	Critical depth
d_f	ft.	Depth of flow
g	ft/sec^2	Acceleration of gravity = 32.2
n		Manning roughness coefficient
Q	cfs	Rate of discharge
r	ft.	Hydraulic radius = A/wp
s	ft./ft.	Slope of channel
s_c	ft./ft.	Critical slope
T	ft.	Top width of water surface in a channel
V	fps	Mean velocity of flow
Vc	fps	Critical velocity
wp	ft.	Wetted perimeter - length of line of contact between the flowing water and the channel
Z		Section factor for critical flow

Equations

$$V = \frac{1.49}{n} r^{2/3} s^{1/2} \qquad Q = AV \qquad Q = \frac{1.49}{n} Ar^{2/3} s^{1/2} \qquad Z = Q/q^{1/2}$$

Geometric Formula

Trapezoidal	Rectangle	Triangle
$A = (b + cd_f)\, d_f$	$A = bd_f$	$A = cd_f^2$
$wp = b + 2d_f\, (1 + c^2)^{1/2}$	$w = b + 2d_f$	$wp = 2d_f\, (1 + c^2)^{1/2}$
$T = b + 2\, cd_f$	$T = b$	$T = 2\, cd_f$
$r = \frac{(b+cd_f)\, d_f}{b+2d_f\, (1 + c^2)^{1/2}}$	$r = \frac{bd_f}{b + 2d_f}$	$r = \frac{cd_f}{2\, (1 + c^2)^{1/2}}$

OPEN CHANNEL

SYMBOLS, EQUATION, AND GEOMETRIC FORMULA